SERVICE REPAIR

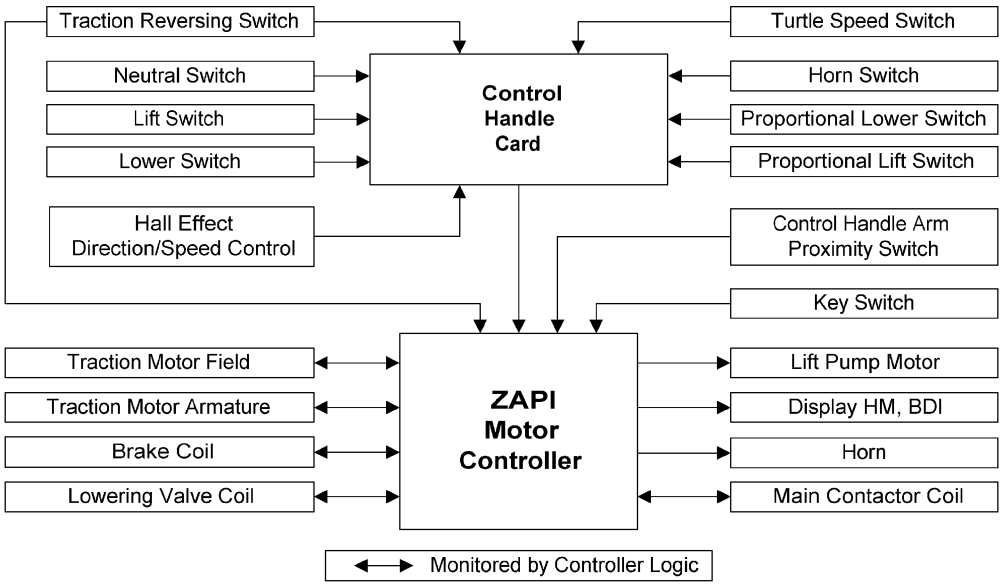
MANUAL

Hyster D215 (W50Z) Forklift Service Repair Manual

HYSTER

ELECTRICAL SYSTEM

W20-25ZA [A495];
W40Z [B218];
W25-30ZA$_2$ [B495];
W45Z [C215];
W50Z [D215]



HYSTER

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- The Service Manuals are updated on a regular basis, but may not reflect recent design changes to the product. Updated technical service information may be available from your local authorized Hyster® dealer. Service Manuals provide general guidelines for maintenance and service and are intended for use by trained and experienced technicians. Failure to properly maintain equipment or to follow instructions contained in the Service Manual could result in damage to the products, personal injury, property damage or death.
- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

NOTE: The following symbols and words indicate safety information in this manual:

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury and property damage.

On the lift truck, the WARNING symbol and word are on orange background. The CAUTION symbol and word are on yellow background.

TABLE OF CONTENTS

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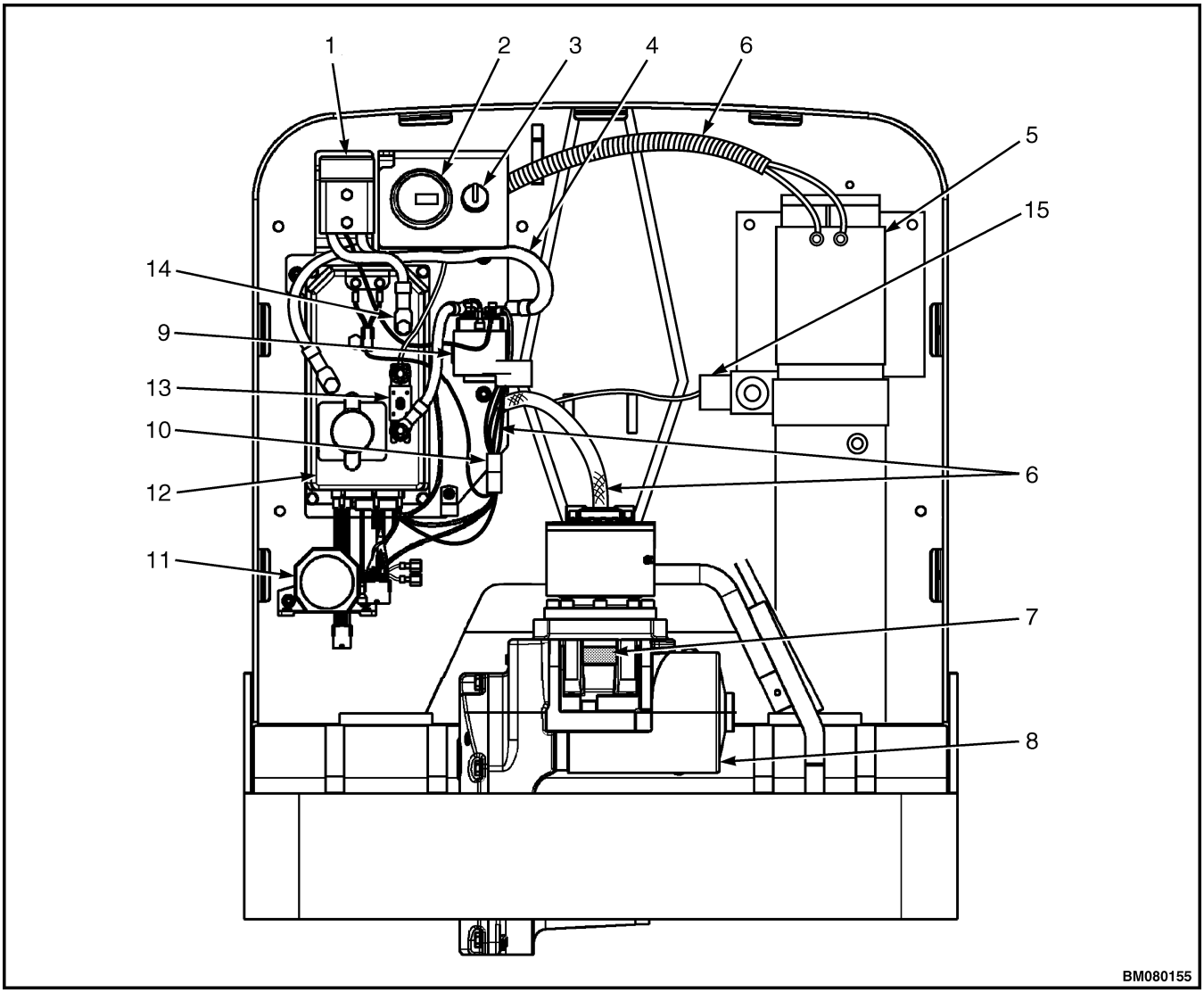
This section is for the following models:

(W20-25ZA) [A495];
(W40Z) [B218];
(W25-30ZA2) [B495];
(W45Z) [C215];
(W50Z) [D215]

General

This section includes removal, disassembly, checks, adjustments, assembly, and installation procedures for the electrical system components on the W20-25ZA [A495], W25-30ZA$_2$ [B495], W40Z [B218], W45Z [C215], and W50Z [D215] truck models. This section does **NOT** include the electrical components covered in other sections such as motors and industrial batteries. See Figure 1.

See the section **ZAPI™ Controllers** 2200SRM1064 for models W20-25ZA [A495] and W25-30ZA$_2$ [B495] ; **ZAPI™ Controllers** 2200SRM1006 for models W40Z [B218]; **ZAPI™ Controllers** 2200SRM1067 for models W45Z [C215] and W50Z [D215] for models for additional information on the ZAPI™ display and for information on troubleshooting fault codes, adjusting parameters, and testing the ZAPI™ motor controller. See the section **DC Motor Maintenance** 0620SRM0294 for general information on DC motors. See the section **Periodic Maintenance** 8000SRM1048 for models W20-25ZA [A495]; **Periodic Maintenance** 8000SRM1009 for models W40Z [B218], W45Z [C215], and W50Z [D215]; **Periodic Maintenance** 8000SRM1379 for models W25-30ZA$_2$ [B495].See the section **Diagrams** 8000SRM1050 for models W20-25ZA [A495]; **Diagrams** 8000SRM1011 for models W40Z [B218] and W45Z [C215];**Diagrams** 8000SRM1228 for models W50Z [D215]; **Diagrams** 8000SRM1381 for models W25-30ZA$_2$ [B495].



1. BATTERY CONNECTOR
2. BATTERY INDICATOR/HOURMETER DISPLAY
3. KEY SWITCH
4. POSITIVE BATTERY CABLE
5. LIFT PUMP MOTOR
6. WIRING HARNESS
7. CONTROL HANDLE ARM PROXIMITY SWITCH
8. DRIVE MOTOR
9. MAIN CONTACTOR
10. CONTROL FUSE
11. HORN
12. ZAPI™ MOTOR CONTROLLER
13. POWER FUSE
14. NEGATIVE BATTERY CABLE
15. LOWERING VALVE

Figure 1. Electrical Components

Description of Operation

See Figure 2 for the logic diagram.

This section includes information on the following components:

- Control handle switches (ON/OFF and proportional)
- Hall effect directional/speed control
- Control handle card
- ZAPI™ motor controller
- Traction motor
- Main contactor
- Brake coil
- Lift pump motor
- Lift time-out
- Batteries

ON/OFF switches are used for:

- Single speed lift and lower functions
- Half speed lift and lower functions
- Horn
- Traction reversing
- Creep (Turtle) speed
- Throttle neutral signal

W20-25ZA and W25-30ZA $_2$: Standard lift switches are ON/OFF type. Standard left-side lift switches are at half speed. The right-side lift switches are at full speed. Optional proportional lifting switches are available on the right side. Proportional switches provide a variable output to regulate the speed of the lift and lower functions.

All lower switches are proportional type switches which allow the operator to maintain maximum control of the load when lowering.

W40-45-50Z : Use only full speed lift and lower switches.

A Hall effect throttle control is used to provide a directional/speed signal. The neutral switch verifies the neutral position during the self check at startup. The Hall effect throttle control, neutral switch, traction reversing switch, horn switch, and creep (turtle) speed switch are an integral part of the control handle card and not serviced separately.

The switches that control the hydraulic functions mount into the control handle and are serviced separately.

The Hall effect throttle control, the proportional switches and all the ON/OFF switches provide input signals to the control handle card. The control handle card uses serial communication to send these signals to the ZAPI™ motor controller.

The ZAPI™ motor controller contains the system logic. The motor controller receives the inputs, processes the commands, and provides outputs to the appropriate component to activate them.

The traction motor armature and separately excited field are powered directly by the motor controller. No contactors are involved in the traction circuit.

The main contactor opens to remove power from the truck to disable all traction and lift functions in the event of an electric failure.

Energizing the brake coil pulls the brake pressure plate away from the friction disc to disengage the brake. The controller powers the brake coil based on signals from the control handle arm proximity switch and the Directional/Speed Control. The controller also contains logic to engage the brake regardless of handle position if the truck is stationary.

W20-25ZA and W25-30ZA $_2$: The motor controller energizes the series wound lift pump motor when either lift function switch is depressed. The applied voltage to the motor varies to adjust motor RPM and pump output to the lift function.

W40-45-50Z : The motor controller energizes the series wound lift pump motor when either lift function switch is depressed.

W20-25ZA and W25-30ZA $_2$: All trucks have a solenoid operated lowering valve at the pump. The motor controller activates the solenoid coil to open the lowering valve. The motor controller varies the voltage to the lowering solenoid to provide proportional lowering.

W40-45-50Z : All trucks have a solenoid operated lowering valve at the pump. The motor controller activates the solenoid coil to open the lowering valve.

The lift time-out protects the lift pump and motor assembly, eliminating the need for a height limit switch. Lift is disabled after the pump runs for a programmed amount of time. Lift is disabled on the W20-25ZA and W25-30ZA$_2$ trucks after operating continuously for approximately 45 seconds. Lift is disabled on the W40-45-50Z trucks after operating continuously for approximately six seconds. The lift time-out feature is reset once lower is selected.

The standard W20ZA, W25ZA$_2$, and W40Z trucks are equipped with a battery pack consisting of 4, 6 volt, deep cycle, automotive style batteries and an onboard 25-amp charger. The battery pack uses a 175-amp, X-type connector. This connector provides two auxiliary contacts for the truck inhibit circuit, allowing the batteries to remain connected to the truck while the charger is operating. The W20ZA, W25ZA$_2$, and W40Z can be configured with a standard 175-amp battery connector to accept the optional GNB PalletPro.

The W25ZA, W30ZA$_2$, and W45-50Z are shipped without batteries. Standard trucks have a 175-amp battery connector and will accept industrial flooded cell batteries or maintenance free batteries, such as the GNB PalletPro.

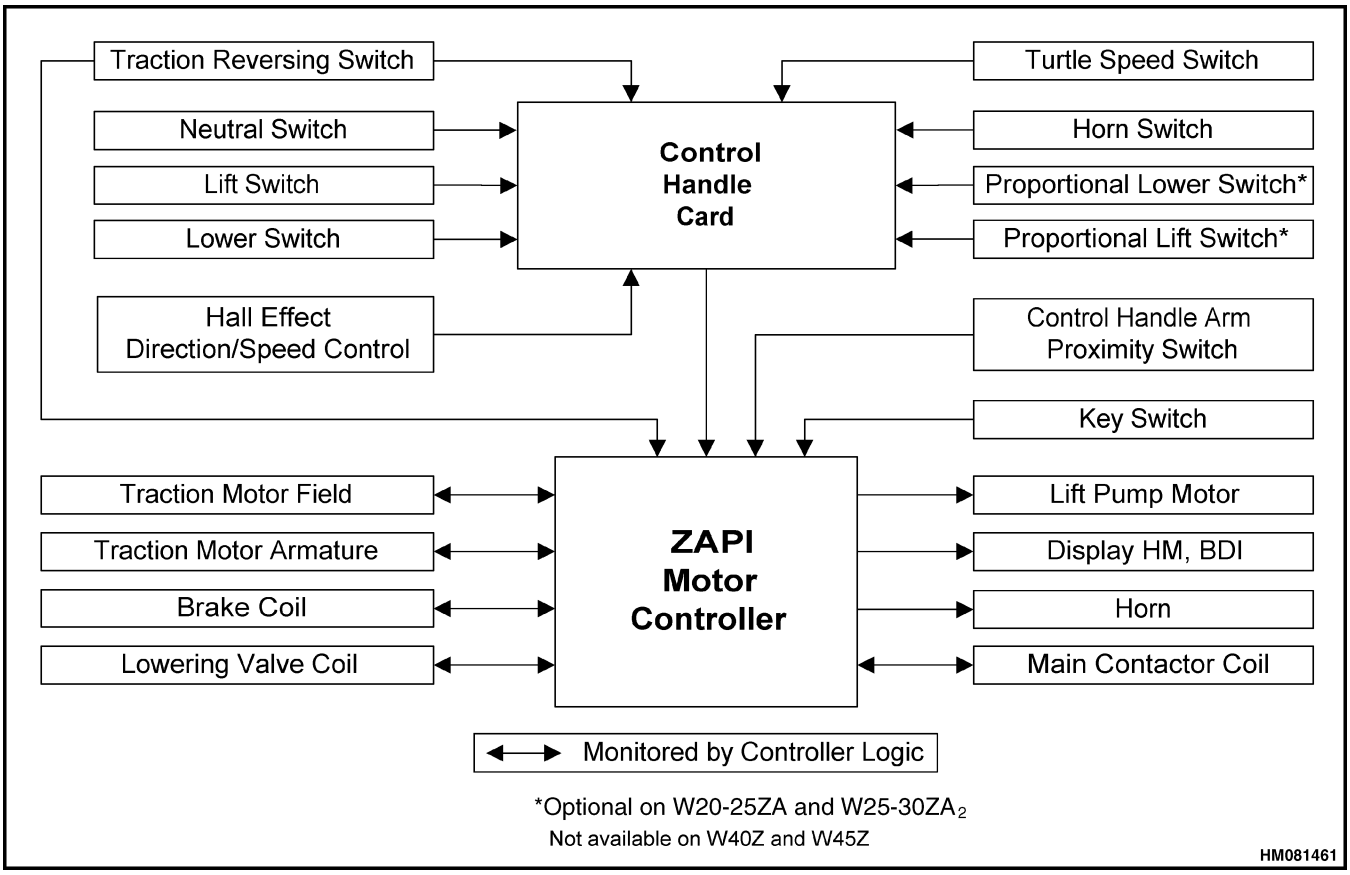


Figure 2. Logic Diagram

Special Precautions

WARNING

DO NOT make repairs or adjustments unless you have both authorization and training. Repairs and adjustments that are not correct can create dangerous operating conditions. DO NOT operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, attach a DO NOT OPERATE tag to the control handle.

WARNING

Disconnect the battery and separate the connector before opening the drive unit compartment cover or inspecting or repairing the electrical system. If a tool causes a short circuit, the high current flow from the battery can cause personal injury or property damage.

WARNING

Some checks and adjustments are done with the battery connected. DO NOT connect the battery until the procedure tells you to do so. Never have any metal on your fingers, arms, or neck. Metal items can accidentally make an electrical connection and cause injury.

WARNING

Before doing any tests or adjustments, raise the vehicle off the ground and block the lift truck to prevent unexpected movement. See the section Periodic Maintenance 8000SRM1048, Periodic Maintenance 8000SRM1009, or Periodic Maintenance 8000SRM1379 for your lift truck. Refer to How to Put a Lift Truck on Blocks.

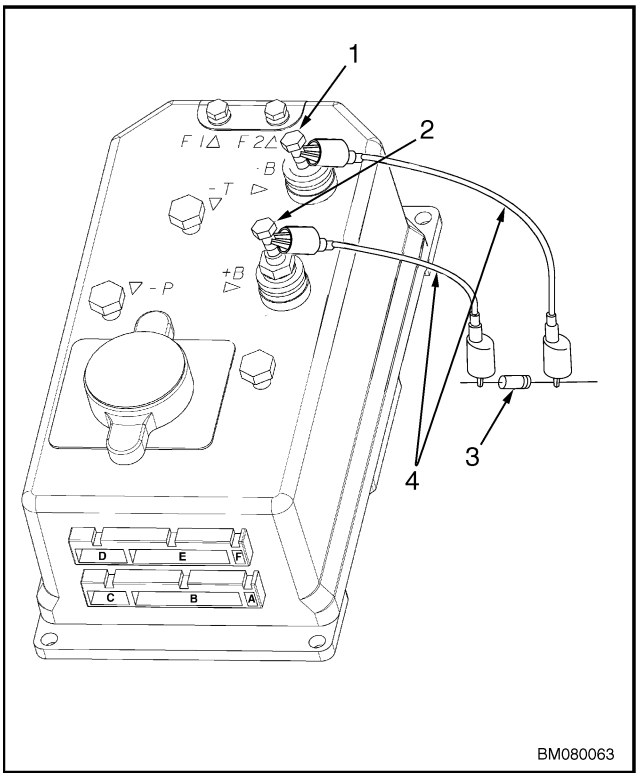
WARNING

The capacitor in the transistor controller can hold an electrical charge after the battery is disconnected. To prevent an electrical shock and personal injury, discharge the capacitor before inspecting or repairing any component in the drive unit compartment. Wear safety glasses. Make certain that the battery has been disconnected.

CAUTION

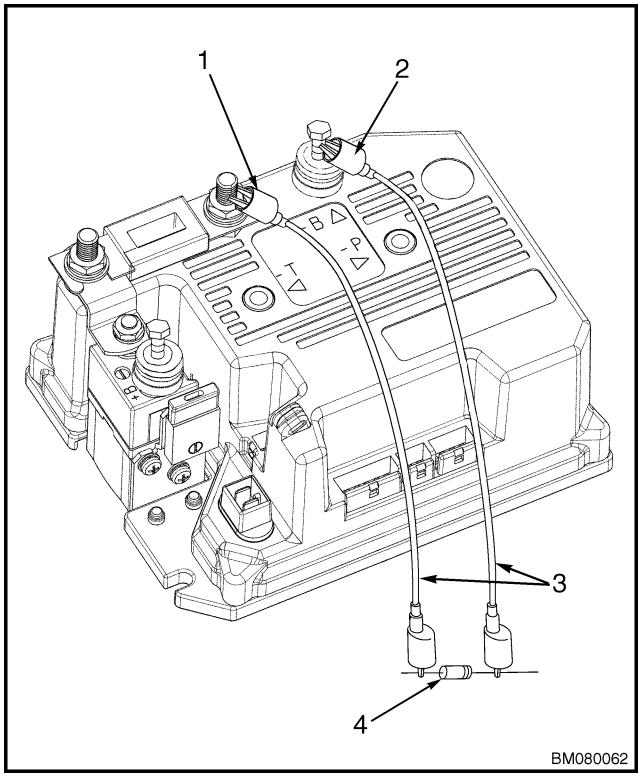
To avoid controller damage, always disconnect the battery, discharge the capacitor, and never put power to the controller while any power wires are disconnected. Never short any controller terminal or motor terminal to the battery. Make sure to use proper procedure when servicing the controller.

1. Block load wheels to prevent lift truck from moving. See the section **Periodic Maintenance** 8000SRM1048, **Periodic Maintenance** 8000SRM1009, or **Periodic Maintenance** 8000SRM1379 for your lift truck.
2. Turn the key switch to the **OFF** position and disconnect the battery.
3. Discharge the capacitors in the controllers by connecting a 200-ohm, 2-watt resistor across the controller's B+ and B- terminals. **DO NOT** short across the motor controller terminals with a screwdriver or jumper wire. See Figure 3 or Figure 4.
4. Remove the 200-ohm, 2-watt resistor before reconnecting the battery.



1. NEGATIVE CONNECTION
2. POSITIVE CONNECTION
3. 200-OHM, 2-WATT RESISTOR
4. INSULATED JUMPER WIRES

Figure 3. Discharging the Capacitor (W20-25ZA, W45-50Z, and W25-30ZA$_2$)



1. POSITIVE CONNECTION
2. NEGATIVE CONNECTION
3. INSULATED JUMPER WIRES
4. 200-OHM, 2-WATT RESISTOR

Figure 4. Discharging the Capacitor (W40Z)

Moving a Disabled Lift Truck

In order to move a disabled lift truck, the electric brake must be released by powering the brake coil with battery voltage. A jumper is provided in the wiring harness to supply battery voltage directly to the electric brake to release it. The truck will roll freely, but the drive motor will not activate while the jumper is installed.

WARNING

Prior to releasing the electric brake, make sure the lift truck is blocked correctly to prevent movement, causing personal injury or damage to equipment.

1. Turn the key switch to the **OFF** position.
2. Disconnect and separate the battery connectors.
3. Remove the upper drive unit compartment cover.
4. Remove the lower drive unit compartment cover.
5. On the main wiring harness approximately 300 mm (12 in.) above the MDU, the brake wiring harness is connected. An extra four-pin connector for the brake override feature is secured near this connection with wire ties.
6. Disconnect the connectors and connect the brake wiring harness to the brake override connector. See Figure 5.

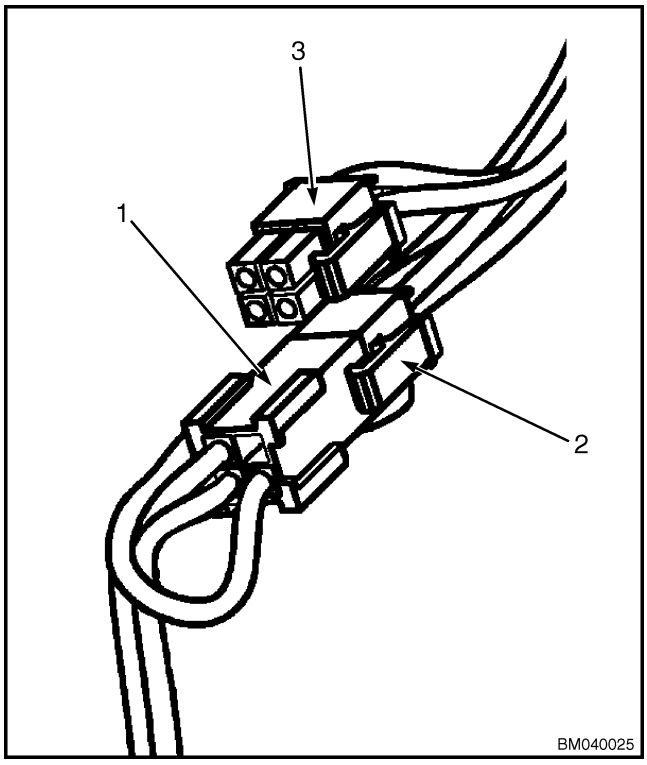
NOTE: The brake will release when battery is connected. The brake will remain released until the battery is disconnected or the brake override circuit is disconnected.

7. Connect the battery connectors.
8. Roll the lift truck to a safe, level area prior to performing any repairs on it.

CAUTION

Always unplug the Brake Override Circuit and connect the Brake Harness prior to operating the lift truck.

9. Make sure the brake override circuit is disconnected from the brake harness. The brake will remain released until the battery or the brake override circuit is disconnected. Restore the harness connector to the normal operation connector correctly before attempting to operate the lift truck.



1. BRAKE HARNESS CONNECTOR
2. BRAKE OVERRIDE CIRCUIT CONNECTOR
3. NORMAL OPERATION CONNECTOR

Figure 5. Brake Override Connector

Electrical System Checks

SAFETY PRECAUTIONS

NOTE: On some models, the dash indicator will display the code: EP 107 (or a higher number) for 1 to 2 seconds every time the key switch is turned to the ON position. This code represents the EEPROM software version and DOES NOT INDICATE A FAULT CODE.

NOTE: These checks require a volt-ohmmeter. Specific checks require additional equipment.

NOTE: The correct meter polarity is necessary for the checks. The voltage checks are made between the individual points and battery negative. Connect the meter negative to battery negative.

1. Block lift truck so the drive wheels are off the floor. See the section **Periodic Maintenance** 8000SRM1048, **Periodic Maintenance** 8000SRM1009, or **Periodic Maintenance** 8000SRM1379 lift trucks. Refer to How to Put a Lift Truck on Blocks.
2. Turn the key switch to the **OFF** position.
3. Disconnect and separate the battery connectors.
4. Remove the upper drive unit compartment cover.
5. Remove the lower drive unit compartment cover.
6. Discharge the capacitor. See Special Precautions.
7. Check the specific gravity of the battery. If the specific gravity is less than 1.260, the battery is not fully charged or is damaged. A fully-charged battery has a specific gravity of 1.270 to 1.290. A discharged battery has a specific gravity of approximately 1.165.
8. The truck has an isolated electrical system; neither battery terminal is connected to the truck frame. Check for 50,000 ohms or more between each terminal, one at a time, of the battery connector of the lift truck and a clean connection on the frame. Remove any circuit paths between the controller and the frame of the lift truck, such as a dirty battery case. Carbon dust in a motor or other parts can cause a circuit path. Check for additional equipment that may cause a circuit path to the frame.
9. Check for voltage between each terminal of the connector that fastens to the battery and a clean connection on the frame. Normally there is small voltage (less than 30% of the battery voltage) between the battery and the frame, even though the resistance is very high. A higher voltage can indicate a dirty or damaged battery. Clean battery and battery compartment as necessary.
10. Visually check for parts or wires that are loose or damaged.

NOTE: Make an identification of any wires before you disconnect them. The wires must be connected correctly after checks or repairs.

Repairs

CONTROLLER, REPLACE

When experiencing problems with the hydraulic functions, the controller may not be at fault. **ALWAYS** troubleshoot to verify the component(s) at fault before replacing the controller. Refer to the section **ZAPI™ Controllers** 2200SRM1064, **ZAPI™ Controllers** 2200SRM1006, or **ZAPI™ Controllers** 2200SRM1067 for your lift truck for additional information on the ZAPI™ display and for information on troubleshooting fault codes, adjusting parameters, and testing the ZAPI™ motor controller.

Remove

1. Move lift truck to a safe, level area.

NOTE: Some new controllers may have software upgrades which will not allow previous controller parameters and settings to be transferred.

2. If possible, prior to replacing the controller, note all special customer parameters and settings.

3. Turn the key switch to the **OFF** position.

4. Disconnect and separate the battery connectors.

5. Block drive tire to prevent movement. See the section **Periodic Maintenance** 8000SRM1048, **Periodic Maintenance** 8000SRM1009, or **Periodic Maintenance** 8000SRM1379 for your lift truck.

NOTE: If removing the entire control panel assembly to include the electrical panel plate, it will be necessary to perform Step 6. If only removing the controller, contactor, horn, fuses, or wires, it is not necessary to perform Step 6. See Figure 6 or Figure 7.

6. Remove battery to gain access to control panel screws. Refer to the section **Periodic Maintenance** 8000SRM1048, **Periodic Maintenance** 8000SRM1009, or **Periodic Maintenance** 8000SRM1379 for your lift truck, for instructions on how to remove the battery.

7. Remove the upper drive unit compartment cover.

8. Remove the lower drive unit compartment cover.

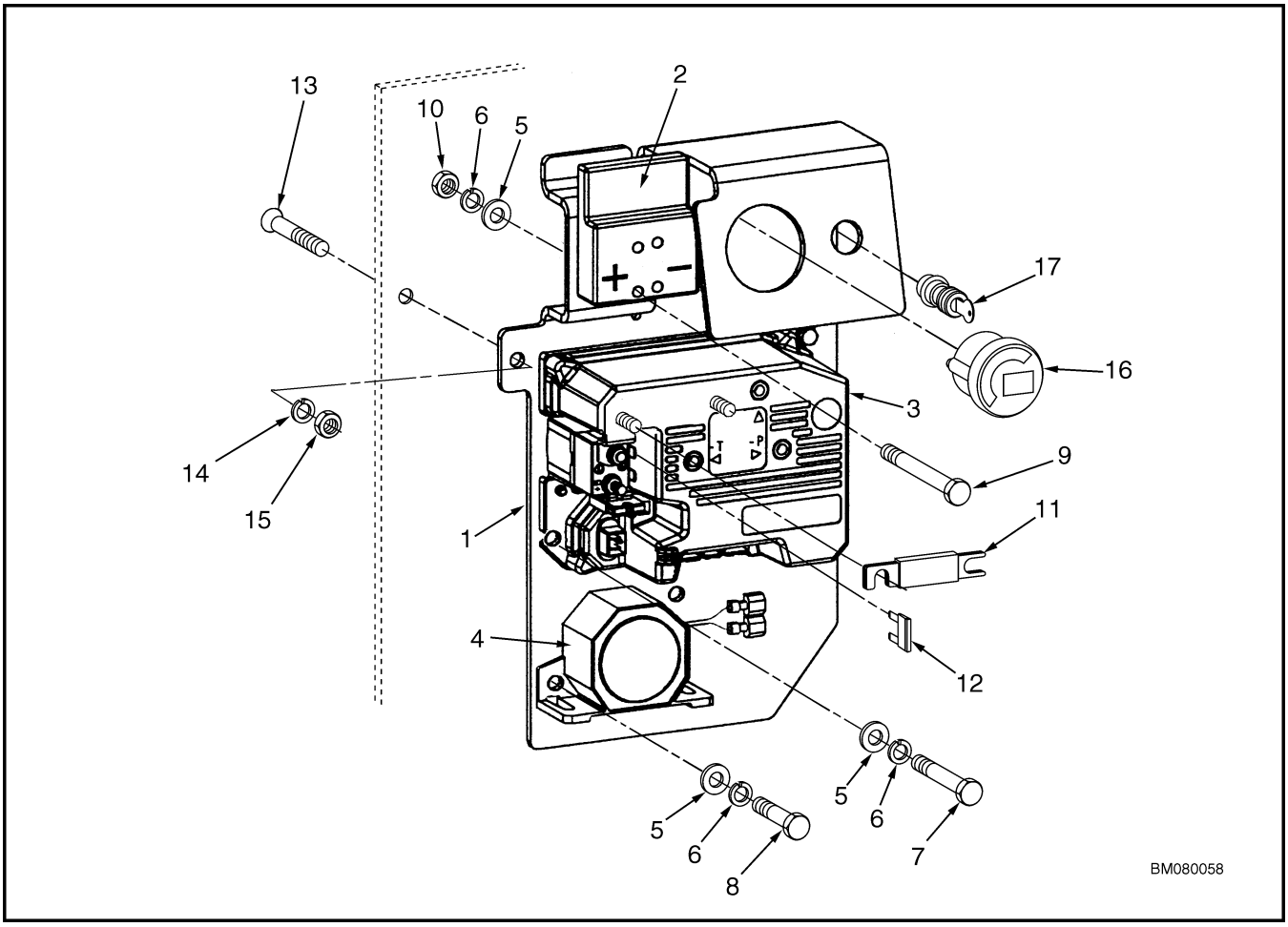
9. Discharge the capacitor. See Special Precautions.

10. Remove the jumper assembly connector from the "E" terminal of the motor controller. If equipped, remove the LED assembly connector from the "D" terminal of the motor controller.

11. Tag and remove the control wiring from the motor controller.

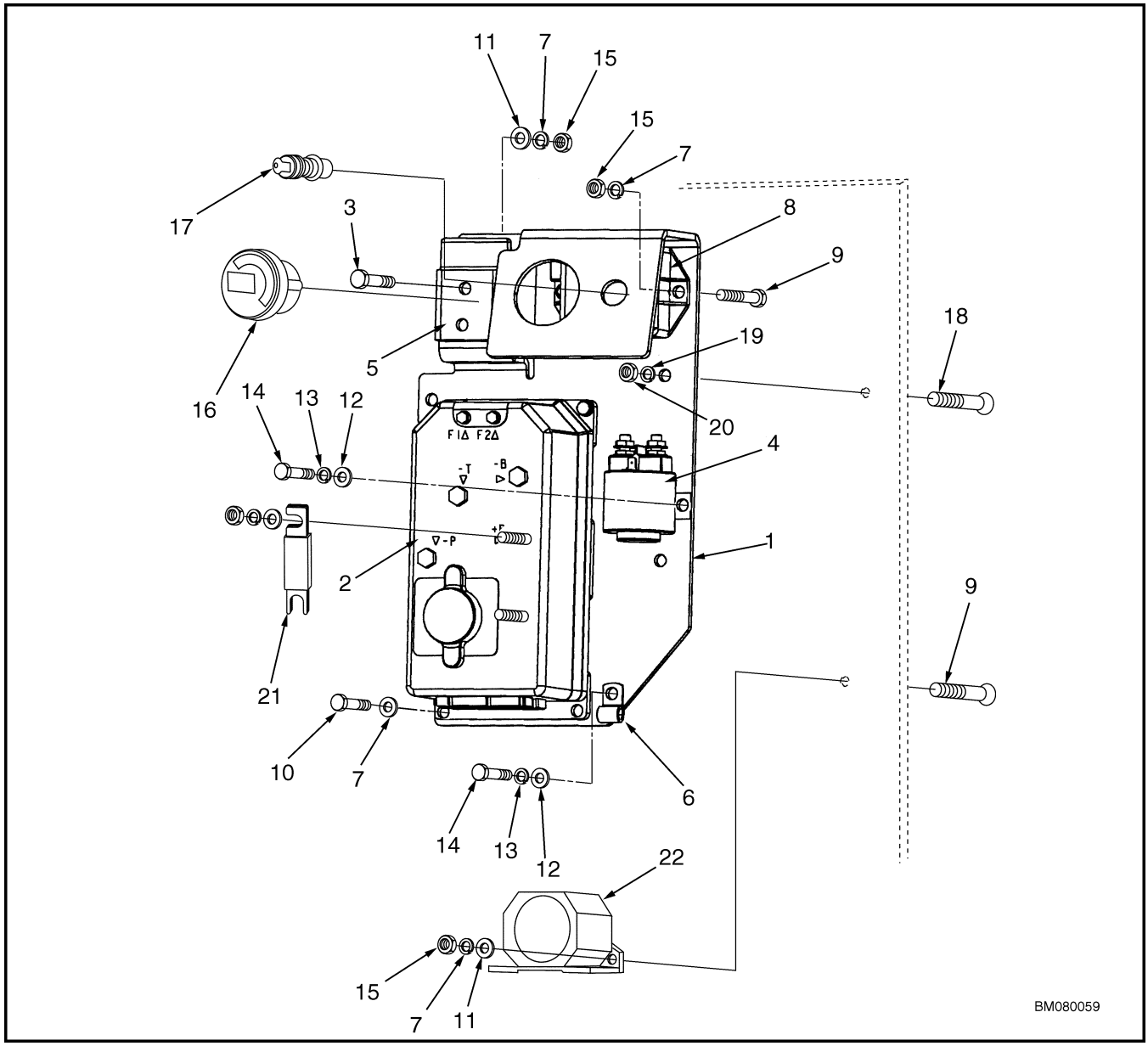
12. Tag and disconnect the power wires from the motor controller.

13. Remove four capscrews and lockwashers that hold controller to plate and remove controller.



1. MOUNTING PLATE
2. BATTERY CONNECTOR (RED)
3. CONTROLLER
4. HORN
5. WASHER
6. LOCKWASHER
7. CAPSCREW
8. CAPSCREW
9. CAPSCREW
10. NUT
11. FUSE (175 AMP)
12. FUSE (5 AMP)
13. BOLT
14. LOCKWASHER
15. NUT
16. DISPLAY
17. IGNITION SWITCH

Figure 6. Control Panel (W40Z)



1. MOUNTING PLATE
2. CONTROLLER
3. CAPSCREW
4. CONTACTOR
5. BATTERY CONNECTOR MOUNT
6. WIRE CLAMP
7. LOCKWASHER
8. CONVERTER (12 V TRUCKS ONLY)
9. CAPSCREW
10. CAPSCREW
11. WASHER
12. WASHER
13. LOCKWASHER
14. CAPSCREW
15. NUT
16. DISPLAY
17. IGNITION SWITCH
18. CAPSCREW
19. LOCKWASHER
20. NUT
21. FUSE (250 AMP)
22. HORN

Figure 7. Control Panel (W45-50Z, W20-25ZA, and W25-30ZA$_2$)

Install

NOTE: If installing the entire control panel assembly to include the electrical panel plate, it will be necessary to perform Step 1. If only installing the controller, contactor, horn, fuses, or wires, it is not necessary to perform Step 1.

1. Install control panel assembly to lift truck by aligning four holes of electrical panel plate with four holes in frame and inserting countersunk capscrews into holes from the battery box side. Install washer, lockwasher, and nut on countersunk capscrews. Replace battery. See the section **Periodic Maintenance** 8000SRM1048, **Periodic Maintenance** 8000SRM1009, or **Periodic Maintenance** 8000SRM1379 for your lift truck, for instructions on how to install the battery.
2. Install replacement controller on electrical panel plate by aligning four holes of controller with four holes in electrical panel plate. Install four capscrews and lockwashers.
3. Connect wires and cables to the same terminals as identified during the removal procedure.
4. Connect the jumper assembly to the "E" terminal, located on the bottom of the controller. See Special Precautions for location. Use procedure that applies to your lift truck:
   a. To use a maintenance free battery, disconnect the wire terminals on the battery selector jumper.
   b. To use a flooded cell battery, connect the wire terminals on the battery selector jumper.
5. Reconnect battery connectors.
6. Turn the key switch to the **ON** position.
7. If available, install customer parameters and settings.
8. Test lift truck in a safe area away from other personnel and equipment.
9. Install the lower drive unit compartment cover.
10. Install the upper drive unit compartment cover.

CONTACTOR COIL, CHECK

1. Move lift truck to a safe, level area.
2. Turn the key switch to the **OFF** position and disconnect battery connectors.
3. Block drive tire to prevent movement. See the section **Periodic Maintenance** 8000SRM1048, **Periodic Maintenance** 8000SRM1009, or **Periodic Maintenance** 8000SRM1379 for your lift truck.
4. Remove the upper drive unit compartment cover.
5. Discharge the capacitor. See Special Precautions.
6. Tag, identify, and disconnect the contactor coil wires.
7. Test contactor coil using an ohmmeter.
8. Touch the probes of the ohmmeter to the coil terminals and measure the resistance between the terminals.
9. Replace contactor if coil resistance readings measure outside of specifications. For contactor coil resistance values, refer to Table 1.
10. Connect contactor wires to the correct terminals.

Table 1. Contactor Coil Resistance Values

Model	Resistance
W20-25ZA and W25-30ZA$_2$	21 ±2.1 ?
W40Z	52 ±5.2 ?
W45-50Z	21 ±2.1 ?

CONTACTOR, REPLACE

Remove

1. Move lift truck to a safe, level area.

2. Block drive tire to prevent movement. See the section **Periodic Maintenance** 8000SRM1048, **Periodic Maintenance** 8000SRM1009, or **Periodic Maintenance** 8000SRM1379 for your lift truck.
3. Turn the key switch to the **OFF** position and disconnect battery connectors.
4. Remove the upper drive unit compartment cover.
5. Discharge the capacitor. See Special Precautions.
6. Tag, identify, and disconnect the wires and cables.
7. Disconnect all wires and cables from the contactor.
8. Loosen two mounting screws and lockwashers that hold contactor to plate and remove contactor.

Install

1. Install contactor by aligning it with mounting screws on electrical plate and sliding into place. Tighten mounting screws.
2. Connect wires and cables to the same terminals as identified during the removal procedure.
3. Reconnect battery connectors.
4. Install the upper drive unit compartment cover.
5. Turn the key switch to the **ON** position.
6. Test lift truck in a safe area away from other personnel and equipment.

Key Switch Removal and Installation

REMOVE

1. Move the lift truck to a safe, level area.
2. Block drive wheel to prevent truck from rolling.
3. Disconnect battery connectors and turn the key switch to the **OFF** position.
4. Remove the upper drive unit compartment cover.
5. Remove the lower drive unit compartment cover.
6. Discharge the capacitor. See Special Precautions.
7. Remove nut retaining the key switch to bracket.
8. Remove the key switch.
9. Identify and disconnect electrical wires to switch.

INSTALL

1. Connect wires to proper terminals.
2. Mount the key switch in bracket.
3. Install nut to retain the key switch. Make certain switch is properly aligned before tightening retaining nut.
4. Connect battery connectors.
5. Test the key switch by turning it **ON** and **OFF**.
6. Install the drive unit compartment covers as removed.

Battery Indicator/Hourmeter Display

NOTE: On some models, the dash indicator will display the code: EP 107 (or a higher number) for 1 to 2 seconds every time the key switch is turned to the ON position. This code represents the EEPROM software version and DOES NOT INDICATE A FAULT CODE.

The Battery Indicator/Hourmeter Display shows battery charge status, truck hours, and fault codes. See Figure 8.

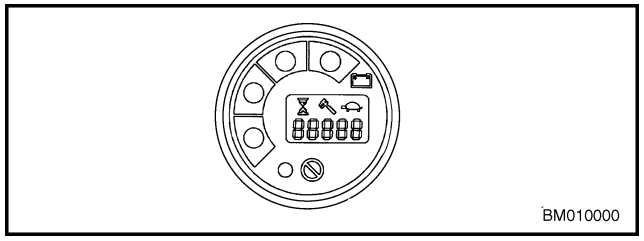


Figure 8. Battery Indicator/Hourmeter Display

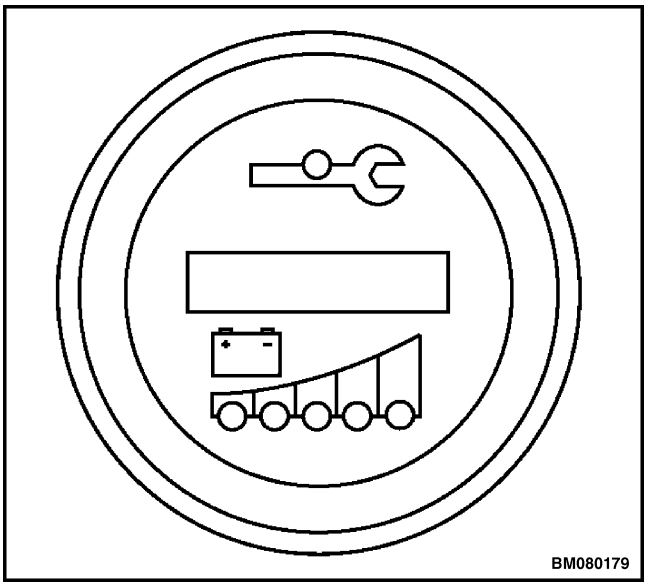


Figure 9. Battery Indicator/Hourmeter Display

REMOVE

1. Turn the key switch to the **OFF** position and disconnect battery.
2. Remove the upper drive unit compartment cover.
3. Discharge the capacitor. See Special Precautions in this section.
4. Disconnect the wire harness plug from the back of the display. Locking tab is hidden underneath rubber boot.
5. Remove nuts and washers holding retaining bracket. Remove bracket and gauge from control panel.

INSTALL

1. Install gauge in control panel.
2. Install retaining bracket, washers, and nuts. Tighten nuts.
3. Reconnect display wire harness plug.
4. Connect battery and turn the key switch to the **ON** position.
5. Test operation of lift truck in a safe area.
6. Install the upper drive unit compartment cover.

Fuses

WARNING

Before checking or changing any fuses, make certain the battery has been disconnected.

Always wear safety glasses. Block the tires, remove the key from the key switch, disconnect battery, and discharge the capacitors before making checks or repairs in the drive unit compartment. See Special Precautions.

W40Z

The W40Z 24-volt motorized hand trucks have two fuses. They are:

1. 175-amp (FU 1) protects both the lift pump motor and the drive motor
2. 5-amp (FU 2) protects the control circuits

W45-50Z

The W45-50Z 24-volt lift trucks have two fuses. They are:

1. 250-amp (FU 1) protects both the lift pump motor and the drive motor.
2. 5-amp (FU 2) protects the control circuits.

The W45-50Z 12-volt lift trucks have three fuses. They are:

1. 250-amp (FU 1) protects both the lift pump motor and the drive motor.
2. 5-amp (FU 2) protects the control circuits.

3. 5-amp (FU 3) protects the 12-volt DC to 24-volt DC converter circuit.

W20-25ZA

The W20-25ZA 24-volt lift trucks have two fuses. They are:

1. 250-amp (FU 1) protects both the lift pump motor and the drive motor.
2. 5-amp (FU 2) protects the control circuits.

If it cannot be determined visually that any of the fuses have failed, check for continuity using an ohmmeter. To replace FU 1, loosen retaining capscrews. Install a new fuse and tighten capscrews. FU 2 is retained by a fuse holder. Make certain that any replacement fuse is of the right amperage before installation.

W25-30ZA$_2$

The W25-30ZA$_2$ 24-volt lift trucks have three fuses. They are:

1. FU 1 protects both the lift pump motor and the drive motor.
2. FU 2 protects the control circuits.
3. FU 3 protects the control circuits.

If it cannot be determined visually that any of the fuses have failed, check for continuity using an ohmmeter. To replace FU 1, loosen retaining capscrews. Install a new fuse and tighten capscrews. FU 2 or FU 3 are retained by a fuse holder. Make certain that any replacement fuse is of the right amperage before installation.

Control Handle Arm Proximity Switch

REPAIR

A proximity switch is used to sense the position of the control handle arm. A target, cast into the base of the control handle arm moves in front of the proximity switch when the handle is in the RUN position, activating the switch and sending a signal to the ZAPI™ Controller. A red LED on the switch illuminates when the target is sensed. Refer to **Brakes** 1800SRM1005.

Check and Adjust

Check the proximity switch for proper operation. All connections must be attached. Take voltage readings from the back of the connector.

1. Move the lift truck to a safe, level area before performing any repairs.
2. Turn the key switch to the **OFF** position.
3. Remove the upper drive unit compartment cover.
4. Remove the lower drive unit compartment cover.
5. Remove the four capscrews from the two-piece shield over the MDU and remove the shields.
6. Turn the key switch to the **ON** position.
7. Verify battery voltage at the proximity switch connector between pin #1 and pin #2.
8. Place negative lead on the battery (-).
9. Place positive lead on the black wire pin #3 of the proximity switch connector.
10. Place the control handle arm in the operating position. Verify that battery voltage is present and the proximity switch LED is lit.
11. Place the control handle arm in the full up or down position. Verify that battery voltage is not present and the proximity switch LED is not lit.

If the proximity switch does not operate properly, check that the gap measurement is within specification and that the wiring harness and connections are good. Adjust the switch gap if necessary or repair any wiring problems. If the proximity switch continues not to function properly, it must be replaced.

Remove

1. Move the lift truck to a safe, level area before performing any repairs.
2. Turn the key switch to the **OFF** position and disconnect the battery.

3. Remove the upper drive unit compartment cover.

4. Remove the lower drive unit compartment cover.

5. Remove the four capscrews from the two-piece shield over the MDU and remove the shields.

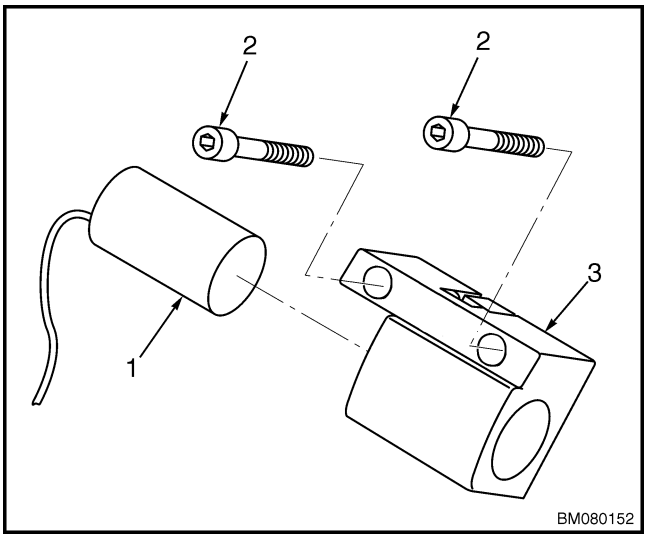
6. Discharge the capacitor. See Special Precautions.

7. Cut the tie wrap located at the end of the proximity switch harness.

8. Remove the proximity switch harness clamp, located beneath the drive unit housing.

9. Disconnect the proximity switch from the wiring harness.

10. Fully lower the control handle arm. Remove the two capscrews that mount the proximity switch assembly to the control handle arm. See Figure 10. Remove the proximity switch assembly.



1. PROXIMITY SWITCH
2. CAPSCREW
3. SWITCH BRACKET

Figure 10. Proximity Switch Assembly

Install

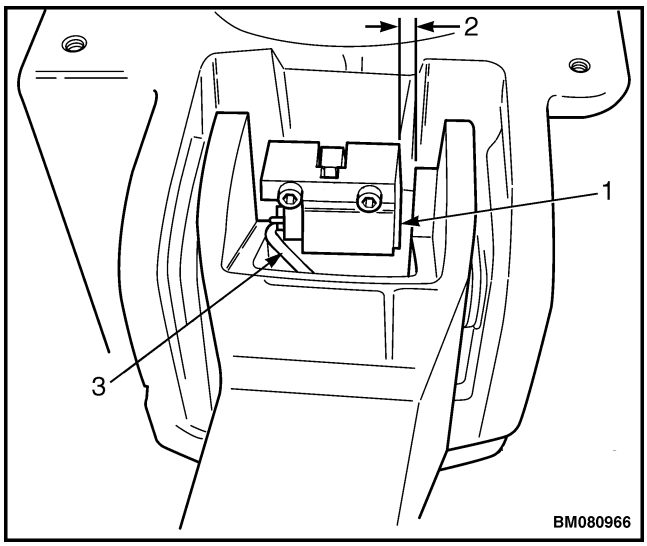
1. Insert the proximity switch fully into the switch bracket. Route the proximity switch wire so that it will not be pinched or damaged when the control handle is installed.

CAUTION

DO NOT damage the plastic switch bracket or proximity switch by overtightening screws.

2. Install the proximity switch assembly to the drive unit housing with two capscrews through the switch bracket into the drive unit housing. **DO NOT** tighten the capscrews until after the switch has been adjusted.

3. Check the gap between the proximity switch assembly and the control handle. The gap should measure 3.0 to 5.0 mm (0.12 to 0.20 in.) See Figure 11. If the gap distance is different, horizontally adjust the location of the proximity switch.



1. PROXIMITY SWITCH ASSEMBLY
2. GAP 3.0 TO 5.0 mm (0.12 TO 0.20 in.)
3. PROXIMITY SWITCH WIRE

Figure 11. Proximity Switch Assembly Location

4. Connect the switch to the wiring harness.

5. Connect the battery and turn the key switch to the **ON** position.

6. With the handle at 10° from vertical, move the proximity switch until the LED turns on.

7. Slowly move the proximity switch in the opposite direction until the LED just turns off.

8. Torque the two capscrews to 4.17 N • m (37 lbf in).